

TABANIDAE FROM CAMDEN HAVEN DISTRICT, NEW
SOUTH WALES, WITH DESCRIPTIONS OF NEW
SPECIES.

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(Plate xlvi.)

In January, 1917, an experimental station was established at Kendall in the Camden Haven district for the study of the means of transmission of *Onchocerca gibsoni* in cattle. During the course of the last three years, while these investigations were being carried on, special attention was paid to the Tabanidae as possible vectors of the larvae whether as mechanical transmitters or as intermediate hosts. Collections of these flies were made for identification and reference, and examination of the material at our disposal shows that many of the species collected are apparently undescribed. Descriptions of the new species will be found in the following paper together with a record of all the species obtained with such notes on the times of occurrence, place of capture, etc., as are available.

Kendall lies on the Camden Haven River, which runs to the north of the West Brother; the valley of the river is practically surrounded by high hills; along the river are rich flats devoted to dairying, with stretches of uncleared bush and patches of jungle in the gullies; near Kendall there is also a good deal of marshy ground, while lower down, the river flows through Watson Taylor's lake before entering the sea. The locality is pre-eminently suitable for the study of Tabanidae as is evidenced by the number of species (41) obtained. Many of the species were taken around the cows in the dairy yards, but others were only obtained in the bush and were rarely or never found in the yards.

SEASONAL DISTRIBUTION.

A table has been constructed to show the weekly records of capture of all the various species found in the locality. Of necessity it is restricted to the months when work was being carried on at Kendall; these however, comprised the summer practically from the end of November to the end of March. Records for the end of 1917 are very meagre, 2 specimens of *Erephopsis gibbula* on 30th October and one each of *T. sanguinarius* and *T. kendallensis* on 4th November. Records for 1918 show that November and December are favourable months for the appearance of many species; in 1917, however, these months were very wet and no flies were about, though they were searched for. In January, 1919, no collecting was done, and as in 1917 work was only commenced during this month, and the records for January are practically confined to 1918.

Study of these records shows that while certain species were equally common during the November-December and January-March periods, as, for instance, *E. guttata*, *E. concolor*, *T. parvicallus* and *T. circumdatus*, in other cases the seasonal incidence is much more marked. Thus the following species were almost restricted to the November-December period—*E. quadrimacula* and *E. contigua*, *D. auriflua*, *D. abdominalis* and *Silvius luridus*. In still further cases the numbers taken during January to March greatly predominate, such are—*D. inflata*, *T. macquarti* and *T. innotatus*. In many species the number of specimens obtained was so small as to make any deductions impossible. It seems possible that in these instances we were dealing with flies which had their headquarters elsewhere and were only of exceptional occurrence in the Kendall District—*D. brevisrostris* is a good instance, as we know it to be common in certain areas—the Blue Mountains, New England and the Clarence River—while only 13 specimens have been taken at Kendall; it is probably a mountain species wandering occasionally down to the coast. The Camden Haven district seems near the meeting point of the northern and southern forms of Tabanidae, both being almost equally represented. As Southern forms may be cited all the *Pangoninae* represented, excepting *Silvius*, and possibly *Caenoprosopeon* and the hairy-eyed group (*Theriopectes*) of the genus *Tabanus*. As Northern forms, all the species of *Tabanus* not belonging to the section *Theriopectes* and the genus *Silvius*. *D. testacea* is a northern species in that

ABANIDAE IN CAMDEN HAVEN DISTRICT.

1918												1919								
February				March				December				February			March					
5-11	12-19	20-26	27-5 Mar.	6-12	13-19	20-26	27-2 Apr.	19 Nov-25	26 Nov-2 Dec.	3-9	10-16	17-23	1-6	7-13	14-20	21-27	28-6 Mar.	7-13	14-20	21-28
37	32	2	4	5	2	5		2	3	42	57	25		13	11	17	15	16	2	
									1										1	3
					1			48	21	278	237	150								
										2	1									
57	29	14	8	2					3	28	66	50	1	13		36	22	24		1
	1		2					78	16	68	18	15			5	2	3			
2								131	35	99	21	78								
										3	7							1		
	1							37	1											
23	17	21	35	90	29	4		10		3					151	353	327	192	8	
		1	3		3					1					4	1	1	1		
5	2	1		2				17	20	298	171	125			4					
30	36	27	16	12	5			12	6	162	122	54	7	6	7	3	3			
		5	4					3	14	43	28			1		1	2	1		
	1																			
66	93	131	29	31	4	1		30	26	95	61	50	15	32	35	12	27	19	4	1
1	1	1						2	2	2	4									
3	4	1		1	2			1	2	3	8		1	4	5	3	7	1		
48	25	37	7	16	8	1			1	4	4		7	28	81	38	20	18	11	2
		1												31						

TABLE SHOWING SEASONAL DISTRIBUTION OF

SPECIES.	Ref. No.	1917						1918								
		February				March		January								
		Jan.	1-7	8-14	15-21	22-28	1-7	8-14	15-21	22-28	29-4 Apl.	1-7	8-14	15-21	22-28	29-4 Feb.
<i>Tabanus kewensis</i>	38	Not	always	disti	ngui	shed	from	<i>T. circum</i>	<i>dat</i>	<i>us</i>						
<i>cyaneus</i>	27 28			1		1						1				
<i>sanguinarius</i>	10	57		7	4	2	(No v. 4, 1917	1 spec.)			35	38	53	2	9	
<i>dauidsoni</i>	32															
<i>ochreoflavus</i>	5	7	1	1		6						8	19	8		7
<i>circumdat</i>	22 23	10	21	63	86	69	6		40	9	1	21	43	1	40	
<i>edentulus?</i>	35	<i>T. edentulus</i>	not	disti	ngui	shed	from	<i>T. circum</i>	<i>dat</i>	<i>us</i>	in	the	field;			
<i>sp.?</i>	11	10														
<i>innotatus.</i>	21	4	1		1				2	1	1	2	9		10	
<i>regis-georgii.</i>	7	118	2	1					2	1	27	30	21	1		
<i>postponens</i>	6	3														
<i>kendallensis.</i>	3	5	19	23	68	4	(No v. 4, 1917	1 spec.)	17	4	5	15	4	36	55	
<i>neobasalis?</i>	25	1	1	1					1			1				
<i>sp.?</i>	26		1						3	1						1

it is found commonest in Northern Queensland, but it belongs to the typically Southern group of *Diatomineura*. The numbers of these groups represented are therefore: Southern 26, Northern 15.

Sub-family PANGONINAE.

EREPHOPSIS GUTTATA Donovan.

Illust. Ent. I. Hym. et Dipt., 1806; Ric., Ann. Mag. Nat. Hist., (7), v., p. 144 (1900).

This fine species was fairly abundant from November 20th to March 20th. It attacks animals fiercely in the bush, especially horses; it is not often seen in the dairies or in the open. In all the 4th posterior cell is narrowed at the margin and in some specimens this cell is actually closed.

TABANIDAE IN CAMDEN HAVEN DISTRICT.

1918											1919									
February			March				December				February			March						
5-11	12-19	20-26	27-5 Mar.	6-12	13-19	20-26	27-2 Apl.	19 Nov	26 Nov	3-9	10-16	17-23	1-6	7-13	14-20	21-27	28-6 Mar.	7-13	14-20	21-28
		4	2	5																
1		2									1									
16	34	53	35	41	10	2		101	179	1159	381	279	19	36	49	77	31	13	11	
1	2	2	1	3	1			11	2	12	2			3			3			
14	15	8	4	5	3	2		54	68	251	92		15	38	35	16	24	7		2
212	275	159	108	88	39	14	2	339	82	321	186	173	9	46	237	344	678	461	33	4
most of the specimens labeled								No.	23	were probably			<i>T. edentulus</i>							
4								4	5	34	5									
15	12	27	19	19	2			3	1	3			1	9	2	4		4		
39	38	14	7	3	2	1		149	40	116	53	85		27	28	32	14	2		
1	1							1												
136	78	20	47	24	13	5		203	22	48	33		3	16	79	118	45	57	137	5
			1					5		4	1									
2	3	7	2	4	3	2														

EREPHOPSIS MEDIA Walker.

List. Dipt., Part 1, p. 142 (1848); Ric., *l.c.*, p. 114.

A single specimen agreeing with the description of this fine species was found among the specimens of *E. guttata* in the collection. It was collected on November 20th, 1918.

EREPHOPSIS NIVEOVITTATA, sp.n.

A moderately large, oblong, black species with a vitta of white hair on each side of the thorax. Not closely allied to any other described species in Australia.

Female. Length, 15 mm; width across eyes, 5 mm; wing, 13 mm.

Head. Black, face with greyish tomentum and fairly numerous black hairs; cheeks clothed with rather long black hair. Beard

black. Proboscis hardly longer than the head, black. Palpi black, 2nd joint long and thin, tapering to a point, club-shaped, feebly concave at base; twice as long as 1st joint. Antennae black, the first two joints moderately densely clothed with black hair. Forehead parallel, black, clothed with black hair and two tufts of dense pilose hair, one above the antennae, one a little in front of the middle. Eyes hairy. Thorax black with a faint greyish stripe on each side of the middle, and one at each side, sides with long dense white hair extending from the anterior border to scutellum. The pleurae black with long dense black hair. *Abdomen* oblongate, black, subnitid, moderately densely clothed in parts with short depressed black hairs; sides with a fringe composed of tufts of long black hair extending from the third segment to the apex.

Wings greyish, hyaline, veins black, stigma faint, yellowish, first posterior cell open, almost closed at the apex; in one specimen the cell was closed; no appendix present.

Legs black, pubescence black.

This species has been placed in *Erephopsis* instead of *Diatomineura*, as the first posterior cell is narrowed towards the margin and actually closed in one specimen. In appearance it is not unlike a small specimen of *E. guttata* but may be readily distinguished by its more oblongate form, without spots on the abdomen and by the clear wings. This was a rare fly at Kendall. Dates of capture were from March 13th to March 29th, and all the specimens were taken in thick bush. A single specimen was also taken at Milson Island on the 21st January, 1918.

EREPHOPSIS AUREOVESTITA, sp. n.

A moderate sized golden-coloured species.

Female. Length, 13 mm.; width across eyes, 5 mm.; wings, 12 mm.

Head. Mars yellow; face clothed with golden tomentum; cheeks with rather fine golden hairs, beard golden. Proboscis short, about the length of the head. Palpi Mars yellow, second joint long and moderately stout at base tapering to a fine point, about three times the length of the first joint. Antennae Mars yellow, the first two segments clothed with similarly coloured hairs. Forehead sub-parallel, moderately broad, clothed with golden tomentum, and with brownish hairs. Eyes clothed with golden hair.

Thorax. Brownish black where denuded in centre, elsewhere covered with golden tomentum, and with scattered depressed golden pubescence and long semi-erect brownish hairs, fringed posteriorly at sides with long, somewhat scanty, golden hairs. Pleurae with tufts of long golden hair. Scutellum Mars yellow with golden tomentum.

Abdomen. Mars yellow more or less densely clothed except where abraded with fine, depressed, golden pubescence, under surface Mars yellow.

Legs. Similar in colour; femora rather lighter.

Wings clear, slightly tinged yellowish along the fore border and at base, stigma yellowish, first posterior cell closed; no appendix present.

A brilliantly coloured golden species not resembling any other Australian form. Three specimens only were taken, two at Kendall in the bush on December 3rd, and one at Lorne about two miles distant on December 17th. Eyes a bright metallic green when alive.

EREPHOPSIS QUADRIMACULA Walker.

List. Dipt., Part 1, p. 138 (1848); Ric., *l.c.*, p. 117.

Specimens of a large maculate winged species agree with the description of *E. quadrimacula*, and pending confirmation from the British Museum have been labelled as such. Specimens were plentiful from November 19th to December 23rd. It was found in the bush and the dairies, and was easy to feed on experimental calves.

EREPHOPSIS CONTIGUA Walker.

List. Dipt., Part 1, p. 138 (1848); Ric., *l.c.*, p. 116.

This species has also been provisionally identified, our specimens agreeing with Walker's description. No field notes are available of this species as in the field they were confused with *E. quadrimacula*, and the notes given above should apply to both species.

EREPHOPSIS CONCOLOR Walker.

Dipt., Saunders, Part 1, p. 14 (1850); Ric., *l.c.*, p. 118.

This species, which has been identified on comparison with Walker's type, has been placed in *Erephopsis* as in our series the first posterior cell is more frequently closed than open, and

as in general appearance it is closely allied to the last two species. It occurred from November 26th to March 26th, and was fairly abundant, especially in February and the beginning of March. Specimens were collected in the bush and dairies.

EREPHOPSIS GIBBULA Walker.

List. Dipt., Pt. 1, p. 140 (1848); Ric., Ann. Mag. Nat. Hist. (7), v., p. 117 (1900). *E. vertebrata*, Bigot, Mem. Soc. Zool. Fr., v., p. 618 (1892). *D. carnea*, Bigot, *l.c.*, p. 618 (1892); Ric., *op. cit.*, (8), xvi. (1915).

Two specimens in the collection are somewhat doubtfully assigned to this species as they differ from Western Australian specimens in having the forehead distinctly narrower. This form occurs not uncommonly in the north of New South Wales and South Queensland, and may require to be separated from the Western species. Both our specimens were taken early in October.

DIATOMINEURA AURIFLUA Donovan.

Gen. Illust. Ent., Pt. 1; Ric., *l.c.*, p. 119.

This well known species was fairly abundant from November 20th till March 6th; specimens were mostly taken in the bush, and it was not often seen in the dairies. Our series shews a good deal of variation in size, and to some extent in the amount of abdominal clothing present. The eyes are metallic coloured green and purple banded, iridescent when alive.

DIATOMINEURA ABDOMINALIS Ricardo.

Ann. Mag. Nat. Hist., (8), xix., p. 209 (1917).

Specimens of this species identified by comparison with a paratype occurred fairly abundantly in November and December, the range of occurrence being November 19th to February 7th. The specimens were mostly collected in the bush.

DIATOMINEURA TESTACEA Macquart.

Dipt. Exot., i., p. 103 (1838); Ric., Ann. & Mag. Nat. Hist., (8), xvi., p. 31 (1915).

One specimen of this Northern species, identified by comparison with specimens from Kuranda occurs in the collection. There is also a series of abraded females which closely approach to *D. testacea*, but which are probably abraded specimens of *D. abdominalis* as traces of the whitish tufts are present at the sides of the thorax.

DIATOMINEURA FULGIDA sp.n.

A dark reddish brown species allied to *D. testacea*.

Female. Length, 12 mm.; width across eyes, 4 mm.; wing, 11 mm.

Head. Reddish brown, face clothed with greyish tomentum. Beard white. Proboscis short, scarcely longer than head. Palpi with second joint elongate, slender, somewhat club-shaped at the base, twice as long as the first. Antennae testaceous, the first two segments reddish brown with black hairs at apices. Front dark reddish brown, slightly wider at vertex than anteriorly, clothed with greyish tomentum and with moderately dense brownish hair; callus elongate, narrow. Eyes clothed with whitish hairs.

Thorax. Dark reddish brown, shiny, shoulders slightly darker, clothed towards side and posteriorly with greyish tomentum; tufts of long whitish hairs present posteriorly on each side above wing roots, scanty in type but forming a distinct fringe on each side in another specimen; pleurae reddish, clothed with greyish tomentum, and long white hairs. Scutellum similar to thorax.

Abdomen dark reddish brown, moderately densely clothed with fine depressed reddish pubescence. Under surface ferruginous with fine depressed pubescence of similar colour and whitish hairs at the side of each segment.

Legs testaceous.

Wings clear, faintly clouded brownish yellow along the fore border, stigma yellowish brown, veins brownish, first posterior cell open; no appendix present.

This species is allied to *D. testacea* and *D. abdominalis* but readily distinguished from both by its darker colour and shiny appearance. Specimens occurred from November 19th to March 3rd, never very numerous; most specimens were obtained in November; all specimens were taken in the bush.

DIATOMINEURA MONTANA Ricardo.

Ann. Mag. Nat. Hist., (8), xvi., p. 34 (1915).

Only two specimens were received, one November 25th and the other February 12th. They are identical with a specimen from Victoria compared with the type in the British Museum.

DIATOMINEURA INFLATA Ricardo.

Ann. Mag. Nat. Hist., (8), xvi. (1915).

Abundant in February and the beginning of March, this fly

never occurred early in the season, the first date being January 28th, and the latest March 29th. Specimens were caught both in the bush and on the cows in the yards, and proved to be a good species for experimental work. The eyes are a brilliant green when alive.

DIATOMINEURA BREVIROSTRIS Macquart.

Dipt. Exot., Supp. 4, p. 326 (1842); Ric., Ann. Mag. Nat. Hist., (7), v., p. 113 (1900); *id.* (8), xvi., p. 29 (1915).

Common on the Blue Mountains and Clarence River, this species was never abundant in the Kendall district, only about a dozen specimens being obtained. Dates range from November 19th to December 8th.

DIATOMINEURA CLAVATA Macquart.

Dipt. Exot., 1, p. 101 (1838); Ric., *op. cit.*, (8), xvi. (1915).

About 20 specimens of this fly were collected, between December 5th and March 28th. They are identical with Victorian specimens compared with the specimens identified in the British Museum.

DIATOMINEURA ? CRASSA Walker.

List. Dipt., Part 1, p. 144 (1848). *Pangonia aurata* Macquart, Dipt. Exot., 1, p. 100 (1838); Ric., Ann. Mag. Nat. Hist., (7), v., p. 120 (1900); *id.*, *op. cit.*, (8), xvi. (1915).

Specimens agreeing fairly closely with Walker's description have been provisionally identified as this species. No field notes are available as the species was confused with *D. auriflua*, but two of the specimens bear dates in November and December.

CAENOPROSOPON WAINWRIGHTI Ricardo.

Ann. Mag. Nat. Hist., (8), xvi., p. 268 (1915).

A single specimen of this species was found; it agrees with a specimen from the Hawkesbury River identified by comparison with Miss Ricardo's type.

SILVIUS LURIDUS Walker.

List. Dipt., 1, p. 140 (1848); Ric., Ann. Mag. Nat. Hist., (7), v., p. 121 (1900); *id.*, *op. cit.*, (8), xvi., p. 260 (1915).

A very abundant species occurring from November 20th to March 6th. It occurs commonly on cattle and horses and especially round about the hoofs. Specimens were also taken in the bush. This species has been identified by comparison with Walker's type.

SILVIUS PARALURIDUS, sp.n.

(Plate xlvi., fig. 7.)

A large, reddish brown species very similar in appearance to *S. luridus*.

Female. Length, 15.5 mm.; width across eyes, 5.25 mm.; wings, 13 mm.

Head. Black; face covered with grey tomentum. Beard white. Palpi long and slender slightly dilatate and concave at base, brownish in colour. Antennae similar to *S. luridus*, third joint slightly less dilatate at the base. Subcallus black, protuberant not shiny as in *S. luridus*. Forehead slightly wider at vertex than anteriorly; clothed with brownish tomentum; frontal callus similar to *S. luridus*, darker in colour and extending farther posteriorly. Eyes bare, ocelli distinct.

Thorax blackish in colour covered with dark brown tomentum with two stripes of grey pubescence on each side; the median pair wider and more brownish in colour posteriorly, shoulders reddish. Scutellum dark reddish brown, covered with dark greyish pubescence.

Abdomen reddish yellow with lighter segmentations, last three segments blackish except at the sides, traces of white median spots on second to fifth segments and with a fringe of whitish hairs at sides, elsewhere clothed with short dark appressed hairs; under surface reddish yellow, dark at apex, segmentations with fringes of short hairs.

Legs reddish yellow, tarsi darker; femora clothed with white hairs; elsewhere black. Spurs present on hind tibia, small.

Wings hyaline, no appendix present, stigma yellowish, inconspicuous.

Very close to *S. luridus* Walker, but a more reddish yellow coloured species. Long series of both species are before us and the differences though slight appear to be constant, and the species are readily separable by their appearance. In its general facies this species presents a strong resemblance to *Tabanus circumdatus*.

This species was very abundant from November 19th to March 4th. Frequently found in the cattle yards; bites the fetlocks of cows and horses almost exclusively.

SILVIUS FERGUSONI Ricardo.

Ann. Mag. Nat. Hist., (8), xix., p. 214 (1917).

Though never very plentiful compared with some of the other

species, a fairly large number of specimens were taken on dates ranging from November 4th—March 7th. Specimens have been compared with the type in the British Museum.

Sub-family TABANINAE.

Group iv.

TABANUS VESPIFORMIS, sp.n.

A large brownish species with yellowish segmentations and bright yellow legs.

Female. Length, 16 mm.; width across head, 6 mm.; wing, 14 mm.

Face reddish yellow with a large brown median spot, cheeks brown in middle, yellowish at sides, clothed with yellowish pubescence, a few straggling creamy hairs; beard creamy. Palpi bright yellowish, 2nd joint moderately stout at base, with rather sparse mingled black and creamy hairs and with long creamy hairs on under surface at base. Proboscis short. Antennae bright reddish yellow, basal joint more yellowish, 1st joint small, subcylindrical, 2nd joint shorter and wider than 1st, a few black hairs at apex, 3rd joint widened and strongly angulate at base, basal portion about equal in length to annuli. Sub-callus yellow clothed with yellow tomentum. Forehead slightly wider at vertex than anteriorly, clothed with brownish somewhat variegated pubescence and with a few golden hairs; callus absent.

Thorax dull black, brownish at sides above wing roots, shoulders yellowish covered with greyish yellow tomentum, with a few straggling cream coloured hairs at sides; pleurae reddish brown with creamy hairs. Scutellum black. *Abdomen* elongate, black with rather narrow, yellowish brown-segmentations clothed with yellowish tomentum. Venter black, segmentations yellowish brown.

Legs bright reddish yellow, femora with yellowish hairs, elsewhere blackish.

Wings long, tinged yellow on the costal cell and at base; veins yellow at base, brown towards apex, stigma inconspicuous, long appendix present.

This species which presents quite a wasp-like appearance from its elongated abdomen is not close to any other Australian species with which we are acquainted. The type which is unique is unfortunately in rather poor condition but we have

described it, as it is such a distinct species. The single specimen was brought in by a schoolboy on February 19th.

Group vii.

TABANUS PARVICALLOSUS Ricardo.

Ann. Mag. Nat. Hist., (8), xiv., p. 394 (1914).

Specimens of this species were compared with Miss Ricardo's type in London, and found to be identical. This was one of the commonest species in the district, specimens being taken from November 19th to March 29th; most plentiful in January and February. These flies were very abundant round the dairies feeding on the cows and were also taken in the bush.

TABANUS TRILINEALIS, sp.n. (Plate xlvii., fig. 3.)

A dark brownish species, thorax with three conspicuous black stripes, and with a median abdominal stripe composed of elongated creamy spots.

Female. Length, 11 mm.; width across head, 4.5 mm.; wing, 10 mm.

Head densely clothed with creamy yellow pubescence and with a beard of the same colour. Proboscis very short and thick. Palpi moderately stout, rather strongly curved, yellowish, clothed with greyish tomentum and short black hairs. Antennae light yellowish brown, 1st and 2nd joints with scattered short black hairs, 3rd joint with basal portion rather long, moderately expanded, obtusely angulate at base and above, but without definite tooth, annuli darker. Forehead parallel, moderately wide, densely clothed with creamy yellow tomentum, and with somewhat scattered brown hairs; callus rather large sub-quadrate, not quite reaching eyes and with a lineal extension somewhat longer than the callus.

Thorax with three, prominent, broad, dark stripes of a dark reddish brown colour approximating to blackish, separated by equally broad, creamy-coloured stripes. Pleurae light brownish rather scantily clothed with hairs. Scutellum light reddish brown, clothed at sides with creamy pubescence, traces of dark brown pubescence in centre continuing the median vitta of thorax.

Abdomen dark brown approximating to warm sepia, with a median row of elongate triangular shaped creamy spots on the segments, becoming shorter posteriorly and forming an almost

continuous vitta, traces of creamy hairs on the spots, elsewhere with brownish hairs. Segmentations narrowly edged with cream, scanty creamy hairs present at the sides of segments. Venter light reddish brown, segmentations creamy, expanding at each side, scantily clothed with brownish hairs.

Legs light reddish yellow, anterior femora darker, anterior tibiae dark at apex, tarsi dark.

Wings hyaline brownish, stigma elongate light brown. Moderately long appendix present.

This species does not appear to be close to any of the described members of group vii., it may be readily distinguished by the very dark stripes on the thorax together with the single line of elongated triangular spots on the abdomen. This is a rare species at Kendall, only a few specimens having been obtained, all in the bush. It occurred from November 24th till February 28th.

Group viii.

TABANUS VICTORIENSIS Ricardo.

Ann. Mag. Nat. Hist., (8), xv., p. 275 (1915).

This was never a very common species, occurring from November 25th to March 15th. The wings in these specimens are more lightly marked than in specimens received from Victoria, but Miss Ricardo informs us she does not consider it specifically distinct.

Group ix.

TABANUS MACQUARTI Ricardo.

L.c., p. 277.

Fairly numerous from November 29th to March 25th. Specimens were collected in the bush and occasionally in the cattle yards.

TABANUS PYGMAEUS, sp.n. Plate xlvii., fig. 2.

A small black fly with pale, narrow, abdominal segmentations.

Female. Length, 8.5 mm.; width across eyes, 4 mm.; wing, 7.5 mm.

Face dark grey, clothed with greyish tomentum; a few sparse whitish hairs, beard scanty whitish; palpi light yellowish brown, rather stout at base, clothed with scattered pale and dark hairs, proboscis very short, hardly longer than palpi. Antennae reddish-yellow, first two joints small with a few black

hairs, 3rd joint with basal portion longer than the annuli, expanded at the base, obtusely angulate without distinct tooth. Front parallel, black, clothed with yellowish brown tomentum; callus subquadrate, large, protuberant, resting on subcallus, reaching eyes on each side with hardly any linear extension. Eyes bare.

Thorax black, clothed with dark brownish tomentum, grey on sides, scutellum similar; pleurae clothed with grey tomentum, and rather scanty whitish hairs below wing roots.

Abdomen black, with very narrow, pale whitish segmentations, clothed with brownish tomentum with scattered depressed brownish hairs and a few white straggly hairs on segmentations. Venter blackish, segmentations narrow, pale, dark brown tomentum in the middle, paler at the sides.

Legs reddish yellow, fore legs darker, tarsi somewhat infusate.

Wings clear; veins brownish; stigma light brown, inconspicuous. No appendix present.

Only a few specimens were obtained. Dates of occurrence January 16th till February 20th.

A small species closely allied to *T. brevior* and *T. parvus*, but with a differently shaped frontal callus reaching the eyes on each side. In general appearance it is very suggestive of *Silvius australis* Ricardo.

TABANUS KEWENSIS, sp.n. (Plate xlvii., fig. 5.)

A medium sized brownish species resembling a light coloured species of *T. circumdatus* in appearance.

Female. Length, 11.5 mm.; width across eyes, 5 mm.; wing, 10 mm.

Face densely clothed with white tomentum, with scattered whitish pubescence. Beard white. Palpi light yellowish brown, slightly thickened at the base, with rather dense, silky white pubescence, thickest at base, intermingled with darker hairs. Antennae yellowish brown, annuli darker, 1st and 2nd joints densely clothed with thick hairs, 3rd joint strongly expanded and angulate at base, basal portion about as long as annuli. Subcallus light brown densely clothed with grey tomentum. Forehead moderately wide, slightly narrowed at vertex, clothed with dense grey tomentum and with scanty brownish hairs, thicker at vertex. Callus light brown, shining, almost square,

reaching the eyes on each side, resting on subcallus, with a moderately long lineal extension to beyond middle. Eyes bare.

Thorax light brown with three darker stripes, darker portions clothed with brownish, the lighter with grey tomentum, with moderately thick dark semierect hairs anteriorly and posteriorly, and with fine scattered white silky hairs; pleurae grey with long pubescence, brown above, white below and posteriorly. Scutellum light brown.

Abdomen light brown (Mars brown) becoming darker to apex, with greyish segmentations, moderately densely clothed with black depressed pubescence, pale creamy hairs on segmentations, thickest at sides and in centre where it forms a series of more or less distinct spots from 2nd to 6th segments. Venter yellowish brown with lighter segmentations, clothed with whitish pubescence, thickest on segmentations.

Legs yellowish, anterior femora with light hairs below, dark above; other femora mainly whitish hairs, tibiae with black hairs.

Wings clear, veins brown, stigma conspicuous, short appendix present.

In appearance this species strongly resembles *T. circumdatus* but will be readily distinguished by the bare eyes. It is perhaps closest to *T. eidvoldensis*, but may be readily distinguished by the more reddish thorax and the light coloured forelegs. Taylor has placed *T. eidvoldensis* in Group vii., but it seems to me that its natural position is with *T. kewensis* in Group ix. The whole question, however, of the grouping of our Australian species of *Tabanus* requires revision. Specimens were taken from February 20th to March 6th, but it was always a rare species.

Group x.

TABANUS CYANEUS Wied.

Ausszwerfl. Ins., 1, p. 152 (1828); Ric., *l.c.*, p. 284.

This fine metallic blue species was never very common. Specimens were obtained between December 10th and March 7th. The eyes are distinctly red when alive. Two of the specimens are decidedly larger than the others, but in other respects identical.

TABANUS SANGUINARIUS Bigot.

Mem. Soc. Zool. de Fr., v., p. 675 (1892); Ric., *l.c.*, p. 287.

An exceedingly abundant species, dates of occurrence ranging

from November 4th to March 26th; most numerous in November and December; more than a thousand were found in one week. It occurred everywhere, in the bush, in the cattle yards, and by the sea at Laurieton. This species died quickly in captivity.

TABANUS DAVIDSONI Taylor. (Plate xlvi., fig. 4.)

Proc. Linn. Soc. N.S. Wales, xlv., p. 65 (1919).

Only a few specimens of this species were collected, some on cows, others resting on a fence; they were not seen outside the Kendall dairies. Dates of occurrence from November 21st to March 15th. A specimen has been kindly identified by Mr. Hill by comparison with Taylor's type.

TABANUS OCHREOFLAVUS, sp.n. (Plate xlvi., fig. 1.)

A medium sized, yellowish brown species, with golden pubescence.

Female. Length, 12.5 mm.; width across head, 5 mm.; wing, 11 mm.

Face densely clothed with yellowish grey tomentum, sides beneath the eyes golden, hairs scanty, greyish; beard white. Palpi moderately long, slightly thickened at base, ochraceous tawny, pale golden hairs at the base. Proboscis short. Antennae,—1st two joints similarly coloured to palpi, apically fringed with black hair, 3rd joint reddish yellow with basal portion longer than the annuli, moderately broad at base, obtusely angulate, with a very small tooth. Forehead narrow, parallel, densely clothed with golden tomentum and with blackish hairs; callus narrow, elongate, reaching not quite to middle.

Thorax black, densely covered with tomentum of an old gold colour, with erect brownish hairs and a scanty depressed golden pubescence, shoulders with old gold tomentum and long dark brown hairs. Pleurae clothed with grey tomentum and with long creamy hairs, scutellum similar to thorax.

Abdomen ochraceous tawny, darker at the bases of segments 3—7, but whole abdomen uniformly clothed with ochraceous tawny tomentum, and dark blackish brown decumbent pubescence, golden along posterior margins, venter light cream, darker at bases of apical segments, thickly clothed with depressed creamy pubescence.

Legs similarly coloured to abdomen, tarsi slightly infusate, posterior tibiae with a fringe of rather dense black hairs.

Wings clear, brownish yellow along the anterior margin, stigma same colour, veins brownish, appendix present.

Judging from the descriptions this species should be distinct from all those previously described belonging to this group. Eyes bright green when alive. Specimens were most plentiful in December and occurred from November 19th till March 29th. Specimens were collected in the bush at Kendall and Lorne and in the cattle yards, generally biting the cow's legs.

Group xi. Therioplectes.

TABANUS CIRCUMDATUS Walker.

List. Dipt., i., p. 185 (1848); Ric., Ann. Mag. Nat. Hist., (8), xvi., p. 280 (1915).

This was the most abundant species at Kendall, dates of capture ranging from November 19th to April 4th. It occurred in the dairy yards and in the bush and, indeed, could be found anywhere, even on the windows of houses. Sometimes they were seen to settle on sheep and apparently bite them. This species lives well in captivity. Specimens agree well with a specimen identified as *T. circumdatus* by Miss Ricardo.

TABANUS EDENTULUS ? Macquart.

Dipt. Exot., Supp. 34, 68., Tab. iii., fig. 13 (1845).

Specimens of a species of *Therioplectes* appear to correspond fairly closely to the Tasmanian species identified by White as *T. edentulus* Macquart. These were not separated in the field from *T. circumdatus*, and the field notes of that species may be taken as applying also to this.

TABANUS SP. ? (Reference No. 11).

A single specimen of a small dark species close to *T. imperfectus* Walker is in the collection. Others, possibly the same, were used in the experiments in the fly cages. The field notes referring to these state that specimens were never plentiful, the dates of collection ranging from November 23rd to February 5th; most specimens were taken in December. It occurred in the bush between Kendall and Laurieton. Pending the acquisition of more material it has been thought advisable not to attach a name to the single specimen. Other specimens (Ref. No. 26) probably represent a distinct species, the only specimens available (3) are too damaged for description.

TABANUS (THERIOPECTES) INNOTATUS, sp. n. (Plate xlvii, fig. 6.)

Large dusky species allied to *T. circumdatus*, black.

Female. Length, 15.5 mm.; width across head, 5.5 mm.; wing, 13 mm.

Face clothed with greyish tomentum and long silvery grey pubescence, beard silvery, subcallus black clothed with grey tomentum, palpi with 2nd joint long, moderately stout at base, dusky yellow, clothed with grey tomentum and whitish hairs. Antennae black, 1st two joints clothed with black hairs, 3rd joint broad at base with prominent angle. Eyes finely covered with scanty hair. Front parallel, moderately broad, clothed with grey tomentum becoming black at vertex; callus subquadrate reaching eyes, with a stout extension reaching a little beyond the middle.

Thorax black, dark reddish brown at sides above wing roots, clothed with dark greyish tomentum and with three indistinct black stripes, hairs blackish; shoulders black, slightly tinged reddish posteriorly, clothed with grey tomentum and long black hairs; pleurae black with grey tomentum and long black and white hairs; scutellum similar to dorsum.

Abdomen black, segmentations very narrowly margined with reddish brown, this colour extending on to the lateral margin; pubescence black. Venter dark reddish brown becoming black at apex, segments lighter reddish brown with whitish hairs at sides.

Legs black, tibiae reddish brown, tarsi dusky, femora with long whitish hairs.

Wings hyaline black, veins black, stigma brownish, long appendix present.

A uniformly dark species of the *circumdatus* group, readily distinguished by its colouration and dark wings. *T. dubiosus* is a smaller species with well defined white segmentations and colourless wings. Specimens were taken from November 31st till March 31st; it was more plentiful in February and March than earlier in the season. Specimens were mostly taken in partially cleared country.

TABANUS REGIS-GEORGII Macquart.

Dipt. Exot., i., p. 132 (1838); Ric., l.c., p. 276 (1915).

Specimens of this species were compared with the British Museum specimens and identified by Miss Ricardo.

This small species was very abundant; specimens were caught mainly in the bush. On Milson Island, however, this species occurs commonly around the feet of the cattle. Dates of occurrence were from November 19th to March 29th.

TABANUS POSTPONENS Walker.

List. Dipt., i., p. 179 (1848); Ric., *l.c.*, p. 282 (1915).

Only a few specimens of this species were collected, dates ranging from November 25th to February 12th. Only one specimen occurs in the collection, the others having been used in the experiments. This has been compared with specimens from Milson Island, which were identified by comparison with the type in the British Museum. The eyes are bright metallic green with reddish brown reflections when alive.

TABANUS KENDALLENSIS Taylor.

Proc. Linn. Soc. N.S. Wales, 1919, xliv., p. 68.

This small species was very plentiful right throughout the season from November 4th to March 30th. It occurred both in the bush and on the cows at milking time. Specimens have been identified by comparison with a paratype received from Mr. Taylor. The species is extremely variable in the colouration of the abdomen and specimens in our series approach very closely to specimens of *T. oculatus*, named from comparison with the type, but appear to differ in the absence of the golden hairs on the thorax, as a rule also the forehead of *T. oculatus* is wider. In both species the eyes are bright green when alive.

TABANUS NEOBASALIS ? Taylor.

Records Australian Museum, xii., 5, p. 67 (1918). *T. basalis* Walker, List Dipt., i. (1848), p. 182; Ricardo, *op. cit.*, (8), xvi. (1915), p. 282.

Specimens of a species that occurred rarely at Kendall have been provisionally referred to this species. The size is, however, larger (13 mm.) and the third antennal joint has the base very broad though hardly angulate above. The type of *T. basalis* Walker was seen in London, and the impression remains that it was not the species we have from Kendall, but a smaller one only separated from *T. kendallensis* by the wholly yellow legs. While any uncertainty exists it seems better to refer the present species to *T. neobasalis*, as it agrees in all except size with Miss

Ricardo's description, until a specimen can be compared with the type.

Specimens were taken at Kendall from November 25th to April 4th, but the species was rare and not always distinguished in the field from *T. circumdatus*.

Specimens are in the collection of the Department of Public Health from Wolseley Park and Wee Jasper.

EXPLANATION OF PLATE XLVI.

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|----------|--------------------------------------|-------------------|
| Fig. 1.— | <i>Tabanus ochreoflavus</i> , n. sp. | Head and antenna. |
| Fig. 2.— | ,, <i>pygmaeus</i> , n. sp. | ,, ,, ,, |
| Fig. 3.— | ,, <i>trilinealis</i> , n. sp. | Head. |
| Fig. 4.— | ,, <i>davidsoni</i> , Taylor. | Head and antenna. |
| Fig. 5.— | ,, <i>keewensis</i> , n. sp. | ,, ,, ,, |
| Fig. 6.— | ,, <i>innotatus</i> , n. sp. | ,, ,, ,, |
| Fig. 7.— | <i>Silvius paraluridus</i> , n. sp. | ,, ,, ,, |

Postscript, added 10th February, 1920.—The species somewhat doubtfully identified as *E. contigua* Walker, *E. quadrimacula* Walk., and *D. crassa* Walk. have proved, by comparison of specimens with the types, to be correctly named. We are indebted to Dr. Guy Marshall, of the Imperial Bureau of Entomology, for these and other determinations.